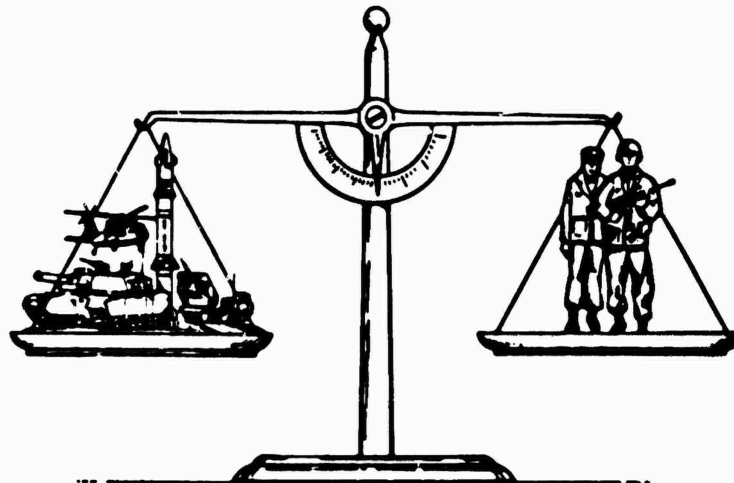


# HARDMAN

Comparability Analysis Methodology  
Guide

AD-A156 791

## Volume V Analysis Support Information



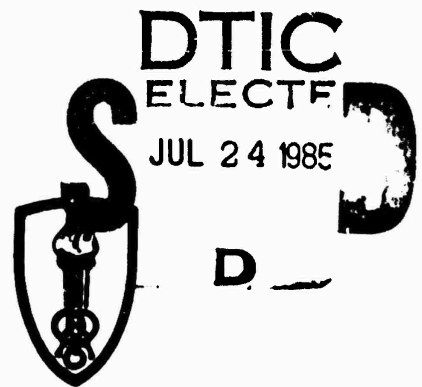
HARDware vs. MANpower

April 1985

DTIC FILE COPY



US Army  
Research Institute



Soldier Support Center-  
National Capitol Region

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## FOREWORD

This is the first edition of the Army HARDMAN Comparability Analysis Methodology Guide. It was compiled jointly under the auspices of the Army Research Institute (ARI) and the Soldier Support Center-National Capital Region (SSC-NCR).

The five volumes constitute a detailed specification of the Army HARDMAN Methodology as applied to major materiel systems. The Guide is intended to provide the Army with a basis for competitive HARDMAN contracting, conducting "in-house" Army HARDMAN applications, and providing HARDMAN training for Army personnel. In the future, many of you may become involved in the process and/or with the products of an Army HARDMAN Analysis. These volumes have been provided as an aid to your understanding of this analytical tool.

It should be noted that the HARDMAN procedures described herein are not expected to remain forever unchanged. Rather, it is desired that HARDMAN evolve over time to better meet the Army's changing information needs on newly emerging systems. You are invited to participate in this evolutionary process by providing your comments on, and recommended improvements to, the Methodology. Such comments concerning the Army HARDMAN Guide or the Army HARDMAN Methodology should be mailed to:

Commander  
Soldier Support Center-National Capital  
Region  
ATTN: ATZI-NMS  
200 Stovall St.  
Alexandria, VA 22332-0400

Additional copies of the HARDMAN Comparability Analysis Methodology Guide will be available through the Defense Technical Information Center (DTIC) in the near future.

# Table of Contents

		<u>Page</u>
Appendix A	Data Operations	A-1
Appendix B	Standard Information Transfer Methods	B-1
Appendix C	Data Source Index	C-1
Appendix D	Glossary	D-1
Appendix E	Acronyms and Abbreviations	E-1
Appendix F	References	F-1
Appendix G	Index	G-1

<u>Table</u>	<u>Title</u>	<u>Page</u>
A-1	Information Requirements Related to Acquisition Schedule	A-3
A-2	Magnitude of Support Request and Appropriate Request Procedures	A-12
A-3	Data Rating Scales	A-15
C-1	Systems Analysis	C-3
C-2	Workload Elements	C-4 - C-6
C-3	Manpower Requirements Determination	C-7
C-4	Personnel	C-8
C-5	Training	C-9 - C-16

<u>Figure</u>	<u>Title</u>	<u>Page</u>
A-1	Sample HARDMAN study plan.	A-5

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Alternatives and Tradeoff Analysis	Manpower Cost and Readiness Drivers												
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Army HARDMAN Methodology Guide attempts to satisfy the requirements of the Army by 1) providing details of analytic procedures to a level which permits analysts to execute the HARDMAN Methodology in an actual operational environment, 2) providing a stand-alone guide with maximum flexibility to appeal to different types of users, 3) incorporating field-tested procedures which have proven to reflect actual MPT costs, 4) incorporating lessons learned with the Army data environment to reflect the real constraints in that area and 5) contributing to the Logistics Support analysis performed in accordance with MIL-STD-1388-1A (Logistics Support Analysis Data Element Definitions).

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# APPENDIX A Data Operations

Data identification, collection, organization, and maintenance are the most crucial and time-consuming requirements of a HARDMAN application. Appendix A is designed to deal specifically with these requirements and has been broken down to the following sub-appendixes:

**Appendix A.1 Identify Data Requirements.** This activity relates specifically to Section 3, Key Activities for Analysis Managers. It deals with determining the scope of data collection requirements for the HARDMAN study.

**Appendix A.2 Identify Data Sources.** This generic appendix lists all available data sources available for a HARDMAN analysis.

**Appendix A.3 Select Data Sources.** Skilled HARDMAN analysis managers and analysts will use the generic list in Appendix A.2 to identify the data sources most applicable to the system under study.

**Appendix A.4 Collect Data.** The actual collection of data is covered here. Specifically, the data collection procedure and sample letters of request for data are included in this appendix.

**Appendix A.5 Evaluate Data.** Data sources and data types vary in their quality. Given that two different data types may be available for a study, the selection of one over the other may be one of the more critical decisions made during a study. This appendix deals with the difficult task of evaluating available data.

**Appendix A.6 Maintain Data.** Storing the data collected so that it is easily accessible and available for viewing, editing, and updating is extremely important. Information regarding how HARDMAN analysis data is maintained and stored will be discussed in this portion of the appendix.

## Appendix A.1 Identify Data Requirements

Identification of the data required for a HARDMAN study involves three major areas of consideration: (1) the scope of the weapon system acquisition, as discussed in Section 3, Volume I of this handbook; (2) the scope of the HARDMAN analysis itself, also discussed in detail in Section 3, Volume I of this handbook; and (3) the identification of data requirements when compared to a list of data already on hand (to prevent time-consuming and costly duplication of data collection efforts). Each of these three areas is discussed below.

As detailed in the identification of data requirements Section 3, Volume I, it is necessary to review numerous parameters associated with the data that is necessary to complete the HARDMAN analysis. An important review involves the Minimum Essential Elements of Information (MEEI) for the first two areas of consideration: (1) the scope of the weapon system acquisition and (2) the scope of the HARDMAN analysis.

1. This step begins with the collection of all available program documentation for the weapon system under study. The document most crucial to definition of the scope of the weapon system acquisition is the Justification for a Major System New Start (JMSNS). This is usually included in the MEEI, as it contains the following information:

- Defense Guidance Element
- Mission and Threat
- Alternative Concepts
- Technology Involved
- Funding Implications
- Constraints
- Acquisition Strategy

Beyond the JMSNS, availability of other system documentation depends upon how the new system has progressed in the Acquisition Cycle.

2. An associated area of concern is the identification of acquisition program requirements. MEEI in this category can be classified in three sub-categories: (a) Acquisition Schedule, (b) Acquisition Goals and Objectives and, (c) Constraints under which the program

office must work in acquiring the New system. The first sub-category, Acquisition Schedule, is typically of two types. Table A-1 outlines the acquisition schedule data required for steady-state and phased analyses.

A steady state analysis is a HARDMAN analysis which will look only at a hypothetical period in the weapon systems acquisition when all systems have been fielded and all predecessor systems have been phased out of the inventory. A phased analysis is a HARDMAN analysis which reflects the actual rate at which systems are added to the inventory.

In a phased analysis, three new systems might be added the first year and no Predecessor System phased out. The second year might see six additional new systems in the inventory (for a total of nine systems). Nine Predecessor Systems might be phased out.

*Table A-1. Information Requirements Related to Acquisition Schedule*

Type	Data
Steady-State Schedule Information Requirements	Date on which first system will be introduced/ installed Average number of systems operating per year Year in which system will begin to be replaced
Phased Schedule Information Requirements System, Subsystem, and Equipment Information Requirement	Operational and technical evaluation schedule Installation schedule of New System Retirement schedule of Predecessor System Ready-for-operational-use schedule



3. The scope of the weapon system acquisition and the scope of the HARDMAN analysis overlap here. If HARDMAN analysis is required to supply only steady-state comparisons (as is most frequently the case early in the materiel acquisition process) rather than phased requirements, then there is little need to collect phased schedule data.

Sub-category (b), Acquisition Goals and Objectives, includes the collection of any information which specifies performance goals/objectives for the system. These may be stated as operational goals such as rounds fired per minute or maintenance goals such as required maintenance man-hours per operating hours or other specified number of metrics.

The last sub-category (c) Constraints, are those "restrictions/groundrules" under which the system must be acquired. These requirements may limit or cap the cost per unit, crew size, logistic support, training provided or established bounds on any number of other system parameters.

4. The second major area of consideration, (2) the Scope of the HARDMAN Analysis, reflects the fact that the requirements of different HARDMAN analyses vary from one application to another. The scope of a HARDMAN study is therefore defined in a HARDMAN study plan. Figure A-1 shows a sample HARDMAN study plan.

HARDMAN STUDY PLAN

SYSTEM \_\_\_\_\_

1. System Range

Mission Area \_\_\_\_\_

Number/Types of Missions \_\_\_\_\_

Number/Types of Commodities \_\_\_\_\_

Number/Types of Platforms \_\_\_\_\_

Number of Components Per  
Commodity \_\_\_\_\_

2. System Environment Range

Number/Types of Operating  
Metrics \_\_\_\_\_

Number/Types of Organizations \_\_\_\_\_

Number/Types of Maintenance  
Levels \_\_\_\_\_

3. Management Environment Range

Program Placement in LCSMM \_\_\_\_\_

Number of Proposed System  
Alternatives \_\_\_\_\_

Prime Materiel Contractors \_\_\_\_\_

Multiple BCS Considered? \_\_\_\_\_

Type/Name of Predecessor \_\_\_\_\_

4. Analysis Range

HARDMAN Steps \_\_\_\_\_

Detailed/General TRRA \_\_\_\_\_

5. Analysis Depth

Level of Indenture \_\_\_\_\_

Skill level \_\_\_\_\_

6. Special Considerations/Notes

Figure A-1. Sample HARDMAN study plan.

## Appendix A

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5. Finally, the third major area of consideration when identifying data requirements is the logical requirement that analysts not spend their own time, nor that of personnel from which they request data, seeking information and data which they already have on hand. Appendix A.6, Maintain Data, deals specifically with the requirement that stored data be easily accessed.

Thus, an obvious reason for easy accessibility of on-hand data is to assure that data can be accessed and reviewed to determine that data requirements of a new HARDMAN analysis are already on hand whether it can be used to partially or wholly satisfy the data requirements.

## Appendix A.2 Identify Data Sources

The process delineated in this appendix will allow the HARDMAN analyst to use the data sources listed in Appendix C. Identification of data sources is the next logical step after determining the data requirements of a study.

Having covered procedures to establish the data requirements in Appendix A.1, the established data requirements of the study need to be compared to the data on hand. Data requirements determined to be unavailable "in house" must be obtained.

Again, Appendix C is provided as a generic list of data sources from which the HARDMAN analyst can request the required data. Methods of selecting the proper data source to meet data requirements is covered in Appendix A.3, Select Data Sources. The standard operating procedures for obtaining data from these sources as well as sample letters of request for information are contained in Appendix A.4 (Collect Data).

### Appendix A.3 Select Data Sources

Use of the Data Source Index (see Appendix C) is discussed in this appendix. The most basic rule for a HARDMAN analyst to keep in mind in selecting data sources is the quality of the data type obtained from various sources. This important issue is covered in Appendix A.5 (Evaluate Data). However, some basic considerations in selecting data sources are:

- 1) Quality (see Appendix A.5)
- 2) Accessibility
- 3) Currency
- 4) Source

Data accessibility is a difficult issue to deal with in a handbook such as this. Several issues must be considered in accessibility. Obtaining data from a particular source may be very easy if the source command is subordinate to the requesting command. Unfortunately, data sources differ in their responsiveness to requests.

A required data type may be held, or obtained in various medium. A desired data type which is held in a magnetic medium by the data source can be accessed in several different ways. Some methods obviously provide greater accessibility than others.

The source command can provide a dial-up capability to access the required data type. It can provide a tape output on demand as well as one on a periodic basis, giving the requesting command updates yearly, every six months, quarterly or monthly.

A desired data type that is held in a print medium may be supplied in various ways. A copy of the document/data may be mailed; an office copy of the document/data may be mailed to the requesting command with a requirement that the requesting command copy it and return the original; or an office copy of the document/data may be loaned with a suspense date by which time the document must be returned to the source by the requesting command.

Also, as with data in magnetic medium scheduled, updates may be supplied on a periodic basis. A desired data type may also be held in microfiche. The requesting command must either have a microfiche reader available or have the microfiche converted to print by a microfiche reader/copier. A final point about microfiche is that experience has shown that many data types that are available as microfiche are also available in either a magnetic or print medium.

A final note on data types available in magnetic medium is that the requesting command must have computer hardware/software and a programmer to write and run the software. This requirement results from the frequent need to develop an extract program to remove required data from the magnetic tape and display it in a meaningful manner for analysts.

The question of how current the data obtained from any data source is must be considered in every study. Obviously, the more current the data, the better. If HARDMAN analyses are going to be conducted regularly, it is a good idea to be placed on any lists the Data Source has for supplying periodic updates.

## Appendix A

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### Appendix A.4 Collect Data

This appendix deals with the procedures used in collecting data for HARDMAN studies. In addition to general guidelines for the requesting data, there are also sample letters of request.

It is often necessary for HARDMAN analysts to contact other Army agencies in order to acquire information in support of a contract. The following is a set of general guidelines for such interactions.

**Rule of Thumb:** The greater the energy which must be expended by the tasked agency, the more formal the request for support must be.

#### Guidelines:

- 1.) Always provide the person contacted with:
  - a. Title of the contract/tasking
  - b. Contract number/tasking authority
  - c. Name of the Contracting Officer's Representative/Analysis Monitor
  - d. Phone numbers of the COR/Monitor:
    - AUTOVON number
    - commercial number

This information should be provided for all phone calls and letters.

2.) Note that it is the perception of the person being tasked which is important. If he or she thinks it requires a letter, then a letter should be sent (see Figure A-2, Sample Letter).

3.) The information request procedure selected should be the simplest procedure which will satisfy the tasked person (see Table A-2).

4.) When in doubt about the appropriate action, check with your project manager or call the COR/Monitor for a decision.

---

The COR/monitor should always be notified in advance regarding any travel to acquire information in support of the application. The same rule of thumb applies to visits. The more support required, the more formal the visit request must be.



## Appendix A

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*Table A-2. Magnitude of Support Request and Appropriate Request Procedures*

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Magnitude of Request	Definition of Information Burden	Appropriate Request Procedure
I. Small	One or two documents or items to be sent	<ul style="list-style-type: none"><li>a. Phone call alone if this appears to satisfy the person receiving the request</li><li>b. Offer a letter if the contact person seems at all reluctant</li></ul>
II. Medium	Any effort which will require the collection of more than 3 or 4 documents or items	<ul style="list-style-type: none"><li>a. Phone call to the party being tasked</li><li>b. Followed by a letter to the tasked agency through the COTR (see example letter, Figure A-2)</li></ul>
III. Large	Any collection of a large number of documents, data, or other items which will require several man-days of effort	<ul style="list-style-type: none"><li>a. Phone call to agency to be tasked</li><li>b. Phone call to COR/Monitor</li><li>c. Letter to COR/Monitor describing the requirement (COR/Monitor will then draft a formal letter)</li></ul>

---

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TO:

THRU: Commander  
US Army SSC-NCR  
ATTN: ATZI-NCM (CPT. Smith)  
200 Stovall St.  
Alexandria, VA 22332-0400

SUBJECT: Request for Information

REFERENCE:

XYZ Corporation has been contracted by the Jet Propulsion Laboratory (JPL), Pasadena, CA, in support of the U.S. Army Soldier Support Center (SSC) under contract # \_\_\_\_\_, issued by \_\_\_\_\_. XYZ will apply the Military Manpower vs. Hardware Procurement (HARDMAN) methodology to the Z3 Radio System to determine the manpower, personnel and training (MPT) requirements of Z3. A contract summary is attached.

XYZ has identified and is requesting the following data/information to support the (HARDMAN Application to Z3) These data are considered essential to the contract effort.

(1)

(2)

(3)

(Further specific information as required:)  
\_\_\_\_\_  
\_\_\_\_\_

XYZ will use the requested information solely for the purpose stated above. All XYZ facilities and personnel are authorized to handle and store classified information.

Your timely assistance will be greatly appreciated. For further information, please call me at ( ) - .

This request is being forwarded through \_\_\_\_\_ and/or \_\_\_\_\_ for approval.

Sincerely,

ENCLOSURE 3

Figure A-2. Sample letter.

## Appendix A.5 Evaluate Data

Evaluating the quality of the information and data used to support the HARDMAN analysis procedures is necessary to determine the credibility of any one analysis and for the application as a whole. The quality of data may be evaluated using a Data Quality Index, which consists of subjective ratings for several factors characterizing the data and information.

Ideally, each item of data to be used in a HARDMAN application should be evaluated with respect to three factors:

Relevance. The applicability or utility of the data to the current application.

Bias. The tendency for a data source to understate or overstate the data.

Reliability. The precision of the means or methods used to collect the data as well as whether the item is internally consistent.

The relevance of data and information should be established by identifying the essential elements of information and potential data sources. Both of these processes were discussed earlier in this appendix.

As used here, bias refers to the tendency of the source — an organization, agency, or individual — to understate or overstate the data being provided. Bias in this context is not meant to infer misrepresentation of the truth, only that past experience with the source indicates a recurring tendency in one direction or the other.

The source may not be aware of this tendency itself, because the appearance of bias may depend on the use of the data. HARDMAN may require data which the source uses for a purpose different from HARDMAN. Consequently, the HARDMAN analyst may discover bias where the source would find none.

The precision of the means used to collect the data or information can also be evaluated. Actual measurement through extensive data collection can provide a more reliable estimate (if the sample size is large enough)

than if the estimate were derived through a model or simulation; both are more reliable than a subjective judgment.

Other aspects of judging data reliability include internal consistency and whether the data are corroborated by information from different sources.

Bias and reliability ratings may be assigned numerical point values. Table A-3 shows a six-point scale for these assignments. Bias and reliability for a particular item of data should be rated independently. The overall quality of the data item can then be obtained using the formula below.

*Table A-3. Data Rating Scales*

<u>Bias</u>	<u>Rating Value</u>	<u>Reliability</u>
None Observed	6	High Reliability; multiple independent confirmations
Seldom Observed	5	Good reliability; some independent confirmations
Sometimes Observed	4	Plausible; few or no independent confirmations
Often Observed	3	Doubtful; no confirmations but cannot be excluded
Consistently Observed	2	Completely improbable
Cannot Be Judged	1	Cannot be judged

$$\text{Quality} = \frac{\text{Bias Rating} \times \text{Reliability Rating}}{6}$$

## Appendix A

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Quality ratings may be obtained for each data item, or class of items, that supports a particular HARDMAN analysis procedure. The overall quality rating for the data used in the analysis is the average of the individual data ratings.

The analyst or analysis manager may then use the data quality rating to gauge the overall credibility of the analysis, as described in Section 3.4, Volume I. The quality ratings relate to the scale in Volume I as follows:

<u>Data Quality Rating</u>	<u>Volume I Credibility Scale</u>
5.1 - 6.0	High
4.1 - 5.0	Good
3.1 - 4.0	Average
2.1 - 3.0	Fair
0 - 2.0	Low

## Appendix A.6 Maintain Data

Data accessibility for modification and deletion purposes is a consideration here. Traceability is also very important. This insures that data can be reviewed by analysts or others who question the results of a HARDMAN analysis.

If a large number of a certain MOS is required by a Proposed System, the analyst should check on items such as the Reliability/Maintainability data and the ratio of indirect workload to direct workload assigned to the equipment for which this MOS is responsible.

Retracing the analysis can be done only if the collected data is organized, formatted, and catalogued in an understandable and accessible manner. The worksheets displayed on the following pages meet all of these requirements. They provide the formats for entering required data as well as sequential numbering for retrieval purposes.

**Acquisition Objectives/Constraints**

**Weapon System:**

Objectives	Constraints

# Acquisition Schedule Worksheet

Weapon System:

Planned/Estimated Schedule		Phase Schedule	
Date	Milestones	Year	No. of Acquisitions;



# Basis of Issue Worksheet

Weapon System:

First Unit Equipped	Acquisitions		Basis of Issue Plan						Replacement Year	
	Total	TOE	Squad/Section	Platoon	Company/Battery	Battalion	Total Battalion	Division		Total Division

# Mission Profile Worksheet

Weapon System:

Predecessor System	
Mission Name	
Mission Characteristics	

New System		
Mission Name		
Mission Characteristics		
System Functions Required by Mission		

# Organizational, Operational, and Support Concepts Worksheet

Weapon System:

New System End Item Equipment			
Mode	Concept	Scenario 1	Scenario 2

Predecessor System End Item Equipment			
Mode	Concept	Scenario 1	Scenario 2

# System Threat Worksheet

Threat Characteristic

Threat Variables Impacting Sys. Funcs.	Sys. Funcs. Rel. to Threat	References

## Operational Environment Worksheet

Weapon System:

Operational Environment Characteristics:

Environment Variables Impacting System Functions	System Functions Related to Environment	References

# Required New System Function Worksheet

Weapon System:

Function Being Considered	No.	Name	Performance Measures	Performance Goals

**Weapon System:**

**A-26**

# Predecessor System Description Worksheet

Weapon System:

Generic System		Predecessor System		MOS/ASI				
Function Number	EQUIP NO.	Equipment		Crew	ORG	DS	GS	DEPOT
		Number	Name					





**Weapon System:**

**A-29**

# Baseline Comparison System Description Worksheet, Part II

Weapon System:

BCS		Functional Allocation					MOS/ASI				
Function Number	Equipment Number	H/W	S/W	Human			Crew	ORG	DS	GS	Depot
				O	S	M					

**Design Difference Index - Baseline Comparison System Performance  
Shortfall Worksheet**

**Weapon System:**

<b>Change Number</b>	<b>EIC</b>	<b>BCS Equipment</b>	<b>Proposed Equipment</b>	<b>Difference</b>	<b>Source</b>	<b>Impact</b>	<b>PV</b>	<b>Remarks</b>

# New Configuration System Description Worksheet - Part I

Weapon System:

ECS		New Configuration							
Function Number	Equipment Number	Function		Equipment					
		Number	Name	Number	Name	ALT 1 ALT 2 ALT 3			

**Weapon System:**

**A-33**

# Reliability/Maintainability Data Worksheet

Weapon System:

Data Included in This Data Source				
Effect	Cause of Failure Inherent	Induced	Direct Workload	Y/N
Crew Correctable (CC) Operational Mission Failure (OMF) Other Unscheduled Maintenance Actions (UMA)	Y/N Y/N Y/N	Y/N Y/N Y/N	Indirect Workload Indirect Workload Factor	Y/N 1,0000
Equipment Type	Inherent Spread Factor	Total Spread Factor	Justification	

Equipment Number	Equipment Name	Data Type	Equipment Type

# Design Difference Impacts on Workload Worksheet

Weapon System:

BCS Group Number	New Equipment Number	Design Differences	Impacts of Workload



## Workload Worksheet

**Equipment Number:**

[illegible]

# Predecessor Task Evaluation Worksheet

MOS/ASI:

Trainer's Guide:

Predecessor System		Equipment Number	
Task Number	Skill Level		
Task Description:			
Duty Position:			
Training	Responsibility	Institution BCT AIT/OSUT PLDC	Unit SOJT Self Study SCHOLD TNG
	PIC/PNCOC BIC/BNCOC ANCOC		
	SNCOC SGMA SVC School		
Primary Materials:			
Devices	None		
Task Modification Code			
Task Deletion Code			

# Operator Training Source Index Worksheet

System:

Configuration:

Representative Equipment for Training Estimation				
Skill Level	MOS/ASI	Source of Task Information	Source of Course Information	
Task Number	Training Responsibility <div> <div> Institution </div> <div> Unit </div> </div>		POI Number	Annex/File Number
	<div> <div>BCT</div> <div>AIT/OSUT</div> <div>PLDC</div> </div>	<div> <div>PIC/PNCOC</div> <div>BIC/BNCOC</div> <div>ANCOC</div> </div>	<div> <div>SNCOC</div> <div>SGMA</div> <div>SVC School</div> </div>	<div> <div>SOJT</div> <div>Self Study</div> <div>SCHOLD TNG</div> </div>

### Configuration:

**System:**

## Representative Equipment for Training Estimation

**A-39**

# Task Generation Worksheet

System:

	Comparable Task			New Task		
	Task Number	Skill Level	MOS/ASI	Task Number	Skill Level	MOS/ASI
Task Des						
Duty Pos						
Training	Responsi- bility	BCT AIT/ OSUT PLDC	Institution PIC/PNCOC BIC/BNCOC ANCOC	SNCOC SGMA SVC School	Unit SOJT Self-Study SCHDLD TNG	Unit SOJT Self-Study SCHDLD TNG
	Prim. Meter	Prim. Meter				
	Devices	Devices				

# BCS Task List

MOS/ASI:

Task Number				Skill Level	
Task Des					
Duty Pos					
Equip. No.					
Training	Responsibility AIT/OSUT	BCT AIT/OSUT PLDC	Institution PIC:PNCOC BIC/BNCOC ANCOG	SNCOC SGMA SVC School	Unit SOJT Self Study SCHDLD ING
	Prim. Mater				
	Devices				

# BCS Task Evaluation Worksheet

MOS/ASI:

Baseline Comparison System					Equipment Number			
Task Number			Skill Level					
Task Des								
Duty Pos								
Training	Responsibility	BCT AIT/OSUT Q PLDC	Institution PIC/PNCOC BIC/BNOC ANOC	SNCOC SGMA SVC School	Unit SOJT Self- Study SCHDLD TNG	Proposed System	Task Modification Code	Task Deletion Code
	Prim. Mater							
	Devices							
						1		
						2		
						3		

# Proposed System Task List

MOS/ASI:

Task Number				Skill Level	
Task Des					
Duty Pos					
Equip. No.					
Training	Responsibility AIT/OSUT	BCT AIT/OSUT PLDC	Institution PIC:PNCO BIC/BNCO ANCO	SNCOC SGMA SVC School	Unit SOJT Self Study SCHDLD_TNG
	Prim. Master				
	Devices				



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## APPENDIX B Standard Information Transfer Methods

This appendix addresses the procedures, forms, and methods required of an effectively organized and managed HARDMAN analysis. Communication of information, classification of problems encountered, etc., is essential to a well-run analysis. The appendix is subdivided into the following sections:

**Appendix B.1 Monthly Report.** A monthly status report or progress report is a useful tool. It is distributed to a number of different individuals/organizations. A sample format and discussion of its uses is included in this appendix.

**Appendix B.2 Meetings.** Meetings are always an excellent means of communicating information between those individuals conducting the analysis and those for whom the analysis is being performed. A meeting provides the ideal forum for exchange of ideas and information in conjunction with a HARDMAN analysis as well.

**Appendix B.3 Briefings.** Briefings, like meetings, provide a good forum for exchange of ideas. A well prepared briefing provides the structure and direction for associated questions and directions. Appendix B.3 deals with the structure and issues which should be contained in a HARDMAN briefing.

**Appendix B.4 In-Process Reviews (IPR).** IPRs resemble meetings and briefings. They provide for communication among the various HARDMAN participants. IPRs must be clearly focused, with this focus being the responsibility of those monitoring the HARDMAN analysis. Appendix B.4 deals with focusing HARDMAN IPRs.

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## Appendix B

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**Appendix B.5 Technical Reports.** Draft and final technical reports are the formal means of relating the results of a HARDMAN analysis. The contents of draft and final reports are discussed in Appendix B.5.

**Appendix B.6 Audit Reports.** One of the main purposes of an audit report is to support the Program Acquisition Office, Soldier Support Center-NCR, and other interested AMC and TRADOC agencies. These audit reports are addressed in Appendix B.6.

**Appendix B.7 Informal Queries.** These queries are similar in nature to the audit reports covered in Appendix B.7 but are less formal.

## Appendix B.1 Monthly Report

A monthly progress report of each in-process HARDMAN analysis is an important control device as well as an excellent means of communicating progress, problems encountered, and other such information. This appendix will deal with the types of information to be conveyed in these monthly status reports. The appendix also includes a sample progress report format.

The monthly progress report is designed primarily to aid those who are supervising the HARDMAN analysis, those who are conducting the analysis, as well as other interested parties in formally assessing the current status of the HARDMAN study. Progress made during the past month, as well as planned activities for the coming month focuses attention on whether the study is on schedule or not.

An important consideration to be included in all progress reports is a section devoted to fund expenditures (if applicable). Spending profiles differ from one study to another. However, monies expended are an important indicator regarding when the work accomplished and the work yet to be done are known. Thus, the progress report informs everyone, including the HARDMAN analysis manager, the HARDMAN analysts, and the COTR, that the study is either on schedule or that there may be problems which must be addressed.

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The content of the progress report is used to evaluate and guide progress and maintain cognizance of study cost. The report contents should include the following information and categories:

- 1) Contractor's name and address (or name as symbol of agency conducting study)
- 2) Contract Number (if applicable)
- 3) Date of Report
- 4) Title
- 5) Serial Number of report (sequence number)
- 6) Period covered by report
- 7) Identification of contract phase (if applicable)
- 8) Description of progress (work accomplished) during the period reported to include any trips taken
- 9) Description of problems encountered during the period reported
- 10) Plans for the coming reporting period including, if necessary, plans to address problems described in Section 9
- 11) Problems resolved. Specific statements as to attempts and successes directed toward solution of previously reported problems.
- 12) General observations. Observations included here should be general rather than study specific. Recommendations as to changes in study approach which would avoid encountered problems or reduce time/cost of studies conducted in the future
- 13) Fund expenditures. This section should include (when applicable):
  - a) Total value of study

## Appendix B

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- b) Funds released
  - c) Funds expended since contract start
  - d) Funds expended during the reporting period
  - e) Funds remaining
  - f) Funds on hand (funds released to the contractor but not yet expended)
  - g) Costs curves depicting both the actual and projected fund expenditures
- 14) Hours charged by person by task for the period being reported
- 15) Person days expended by person, by task cumulatively (to include all previous periods and the period being reported)
- 16) Person days remaining by category of personnel
- 17) Total person days remaining

### Appendix B.2 Meetings

Meetings, to be most productive, should be clearly focused. The focus of any meeting called along with an agenda should be transmitted to each of the meeting members prior to the meeting and again at the beginning of the meeting. A meeting conducted without a clearly defined focus or conducted with a "hidden agenda" can never be fully productive. All participants should be afforded the greatest opportunity to come to a meeting as well prepared as possible. A meeting chairman, the COTR (if applicable), or senior ranking military person should guide and focus the meeting.

It is also their job to see that the discussion remains focused on the agenda or topics. Of course, discussion may turn to topics which are critical but were unforeseen. The chairman should ensure that discussion of topics such as these are limited to a reasonable amount of time. It makes more sense and contributes to a more productive meeting to task certain meeting members to investigate various aspects of the topic to be further discussed at a future meeting.

Meetings fall into two general categories; (1) contractually scheduled briefings and In-Progress

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Reviews (IPRs) and (2) ad hoc meetings and briefings. Each of these is dealt with in the next two appendices.

## Appendix B.3 Briefings

Briefings fall in two categories: Formal/Contractually Obligated briefings and Ad Hoc briefings. The Formal/Contractually planned meetings include two types: In-Process Reviews (IPRs) and briefings which are either separate Contract Deliverable Line Items (CDRLS) or part of a CDRL. The first, IPRs, are addressed in Appendix B.4. Only the briefings which are Ad Hoc or separate CDRLs are addressed in this appendix.

Formal/Contractually Obligated briefings usually focus on study findings. The briefing content and that of supporting briefing charts summarize findings of the HARDMAN analysis. Often, these briefings are required as an adjunct to the Final Report.

The purposes of such a briefing are to: (1) disseminate the major findings of the HARDMAN study to the Program Office staff, COTR (if applicable), and other interested parties. The briefing and accompanying charts are, in essence, an overview of significant findings. The second purpose is to deliver the supporting charts to the Program Office, COTR, or both for their use at ASARC meetings or briefings to other interested parties.

The specifics of briefing chart preparation are noted in Appendix B.4, In-Process Reviews. The same considerations apply to briefing charts prepared for Formal/Contractually Required briefings and are not reported here.

Ad hoc briefings may be given in response to requests for Audit Reports or Informal Queries. Each of these is addressed in separate appendices: B.6, Audit Reports and B.7, Informal Queries. The reader tasked with preparation of an ad hoc briefing is referred to both Appendix B.6 and Appendix B.7.

In general, ad hoc briefings resulting from either an audit report request or informal query will be tailored to answer the questions raised. These briefings are

used to communicate interim findings or to resolve problems. All briefing charts, as well as the text of the briefing, should be limited to addressing the questions posed. Once again, the reader is referred to Appendixes B.6 and B.7.

### Appendix B.4 In-Process Reviews (IPR)

A HARDMAN analysis usually has two In-Process Reviews (IPRs). The first is scheduled to occur after the completion of Systems Analysis and development of the HARDMAN Consolidated Data Base. The purpose of this IPR is to present the results of the system's description and data collection efforts.

These two activities, which make up the heart of any HARDMAN analysis, afford an important time for a review. Critical assumptions about the system, the way the system will be deployed, manned, or flown are made. Equally critical assumptions about data availability, type of data to be used, and data location are also made. This IPR provides the communication necessary to insure that all involved in the HARDMAN analysis understand these initial parameters and system assumptions.

The second IPR normally occurs at the completion of Impact Analysis. This too presents a critical opportunity to influence the study. By the time Step 5 (Impact Analysis) has been completed, the manpower, personnel, and training analyses have been done, and the impact that manpower, personnel and training requirements of the new system will have on the Army's critical resources are known. Presentation of these findings to the COTR, Program Office, and other interested parties provides a forum for sharing ideas for Step 6 (Tradeoff Analysis), which will reduce these requirements, especially in areas of critical MPT resources.

## Appendix B.5 Technical Reports: Draft and Final

The principle findings of a HARDMAN study are communicated officially to all concerned parties through Draft and Final Reports.

All of the following information relates to draft and final reports alike. The major difference between the two is that the draft is issued, comments from interested parties received, and these comments incorporated where deemed appropriate by the author, HARDMAN analysis manager, and HARDMAN analysts.

Specifically, the following items should be considered and incorporated in every draft and final report:

- 1) Cover and Binding. The covers and bindings should be durable and of good quality. The cover should include the security classification at top and bottom of both front and back cover.
- 2) Title Page. The following should be listed on the title page:
  - a) Title of report
  - b) Authors
  - c) Date of publication
  - d) Name of the activity or contractor which prepared the report
  - e) Contract number
  - f) The document's security classification printed at the top and bottom of the title page
  - g) Security warning and other use and distribution limitation statements
- 3) Abstract. An abstract, preferably limited to 150 words, will appear on the page following the title page.
- 4) Table of Contents



- 5) Body of the Report. The report body contains the following general areas of discussion:
- a) Summary. This section is designed to give the reader and management a complete coverage of the purpose, conclusions, and recommendations of the test, project or study.
    - (1) The summary should contain a concise statement of the purpose (objective) of the project, test, design, modification, or study covered by the report.
    - (2) Conclusions reflecting the results of the project should be listed in order of importance, should be concise, and should be substantiated by factual data presented in the report.
    - (3) Recommendations should be listed in order of importance and be based on conclusions. They must be clear, positive, forthright statements which are easily understood.
  - b) Background. This section should contain information which contributes to the reader's understanding of the need for the project and a better understanding of the results of the project. This section may include previous work accomplished which led to the present study.
  - c) Discussion. This section should present the factual data upon which the conclusions and recommendations are based. It is essentially the main portion of the report in which the author presents the data and analysis by which conclusions were attained. The varying subject matter covered in technical reports make it impossible to provide a specific outline for preparing the discussion section of reports.

This section should be presented in logical sequence, chronologically if no better sequence is indicated. For example, a suggested list of subjects which may be treated in the discussion section of equipment test reports may include a description of equipment, methods of procedure, results of tests, analysis of tests, conclusions, etc.

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d) Author's Signature. The author signs at the end of the report. This signifies the validity of the conclusions and recommendations contained in the report.

e) Security Classification. The security classification of the report must appear on every page which contains classified information. For all pages other than the covers and title page, this classification will appear in capitals at the top left and bottom left of the page, one and one-fourth inches from the left edge and one-half inch from the top or bottom of the page.

7) Appendices. These sections should contain the illustrations and supplementary reference information needed for a complete understanding of the report. These sections should carry an alphabetical designator (such as Appendix A, Appendix B, etc.) and may include such information as:

- a) Photographs
- b) Equipment drawings
- c) Block and schematic circuit diagrams
- d) Tables
- e) Glossary
- f) Bibliography. (Includes all references used in preparing the report and all known publications previously prepared on the subject.)

8) Presentation of Report. The report should meet the following requirements:

a) Test material shall be in the form of black characters on white, opaque paper.

b) Halftones shall be kept to a minimum; black and white line work shall be on white, opaque paper. Colors shall be used only when they serve a functional purpose which cannot be served by cross-hatching, striping, or other similar techniques.

c) Charts, tables, and graphs shall appear in a size large enough to be clearly legible. Graph coordinates and grid lines shall be spaced as far apart as is practical.

d) Standard pages shall be 8 x 10-1/2 or 8-1/2 x 11 inches. Sketches, drawings, diagrams, etc., may exceed the standard page size to form foldouts where the alternative would be extreme reduction in size or graphic material.

e) Beginning with the first (title) page, all pages shall be numbered with arabic numerals, placed in the center of the bottom margin.

f) Adequate margins shall be allowed so that the complete text can be easily read when the report is in bound form.

Additional considerations in the preparation of draft and final technical reports is that all required technical findings of the study are included in the body of the report. This should include, but not be limited to the following:

- 1) Estimates of the operator, maintainer, and repairer manpower requirements of the materiel system being developed by Military Occupational Specialty Code (MOSC) and Additional Skill Identifier (ASI).
- 2) Comparability analysis of manpower requirements of alternative system concepts or designs for the materiel system being developed.
- 3) Comparison of materiel contractor furnished manpower estimates with independently developed HARDMAN estimates.
- 4) Assessment of probable impact of the materiel system being developed on personnel resources of the Army, by MOSC/ASI.
- 5) Assessment of probable impact of the materiel system on training resources of the Army, by MOSC/ASI.

- 6) Identification of generic maintainer and repairer tasks that are likely to be required by the materiel system being developed.
- 7) Assessment of tradeoffs between design of the materiel system being developed and manpower, personnel and training impacts to define least cost/most effective design alternatives.
- 8) Narrative interpretations of the above data products.
- 9) Narrative and mathematical specifications of the analysis procedure used on the given materiel system.
- 10) Audit trail reports that specify the detailed analysis conducted to arrive at specific subsets of conclusions.

One further category of information to be included in HARDMAN study reports are: Findings designed to extend, enhance, standardize, and/or transfer the HARDMAN analysis technology will also be required. These products may be data bases, training, written specifications of generic analysis method, etc. The purpose of these products is to enhance the Army's capability to conduct and/or manage analyses in-house and/or to facilitate technology transfer for the purpose of establishing a competitive capability among numerous contractors.

## Appendix B.6 — Audit Reports

Audit Reports are specific requests originating from the Program Management Office, COTR (if applicable) or other interested AMC or TRADOC groups through either the PMO or COTR. The purpose of an audit report is to request that the contractor (if applicable) or agency conducting the HARDMAN Analysis substantiate a submitted finding. It is most common for these Audit Report requests to result from statements, data and findings published in a draft report. However, an Audit Report request may originate from any briefing or IPR where interim findings are presented.

## Appendix B

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Upon receipt of a request for an Audit Report, the agency conducting the HARDMAN Analysis will exercise the HARDMAN Audit Trail. That is, the questioned data, statement or finding will be researched to discover the substantive data which contributed to the reported data, statement or finding.

A practical example would be a particularly high demand for a certain maintenance MOS. The Audit Report would detail the specific maintenance manhours, per maintenance level, per item for which that MOS is responsible. The source of each Reliability/Maintainability factor, direct and indirect workload, assumed factors for data not available and the substantiation of such assumptions would be supplied for each piece of equipment the MOS worked at each maintenance level.

When audited data are found to be faulty or incorrect, the audit report should detail how the error came to be and recommend methods of avoiding such errors in future studies.

### Appendix B.7 Informal Queries

Informal Queries are much like Audit Reports, although less formal. The reader is referred to Appendix B.7, Audit Reports, as that explanation is helpful in preparing a response to an informal query.

As with ad hoc briefings, informal queries are an informal means of communicating technical information to the COTR, Program Office, or other interested agencies who must request and receive data through the COTR.

Information may be transmitted by telephone or letter as requested by the COTR. Informal queries also include the instances when the COTR calls the HARDMAN analysis manager and asks a technical question. The contractor or agency conducting the analysis should view these informal queries as a means of enabling the COTR to stay up-to-date and to participate in the study.

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## APPENDIX C Data Source Index

As noted in Volumes I through IV, a HARDMAN analysis draws heavily on many sources of data. The methodology has proved to be capable of providing reliable results extremely early in the materiel acquisition process, when information is scarce and/or sketchy. Data, whatever the quality, remain a requirement. When data are not available, comparability analysis is applied to calculate approximations.

The data source index (DSI) in this appendix is a stand-alone reference document for creating the Consolidated Data Base. Information is presented in five categories:

- Systems Analysis (Table C-1)
- Workload (Table C-2)
- Manpower (Table C-3)
- Personnel (Table C-4)
- Training (Table C-5)

The DSI is extensive but not exhaustive. Space has been left under each category for the analyst to note additional sources and qualitative comments.

Acronyms and abbreviations are used liberally to save space in the DSI; a key is provided at the end of this appendix. The full titles of documents cited are also included in that list.

Summaries of five primary documents are presented below in the same order as they are developed. In other words, the statement of Required Operational Capabilities (ROC) contains much more detailed information than the Mission Area Analysis (MAA). The summaries are taken from AMC/TRADOC Pam 70-2 (Materiel Acquisition Handbook).

Mission Area Analysis (MAA). The need for a development or acquisition program is supported by ongoing effort. This effort, called MAA, constantly assesses the capability of a force to perform within a particular battlefield or functional area. MAA synthesizes information gained from many individual studies and analyses into a single, internally consistent framework.

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Operational and Organizational Plan (O&O Plan). The O&O Plan provides decision-makers with the minimum essential information necessary to initiate the Concept Exploration Phase and provides specific guidance for follow-on actions. The O&O Plan addresses the system as an integral part of an organization rather than as an isolated system. The initial O&O Plan contains as much information as is available and is updated prior to each milestone decision as significant changes occur in threat, technology, or doctrine.

The O&O Plan normally contains plans for operations and organizations as well as training, personnel, and logistics plans for the employment of a hardware system for designated Army organizations.

Justification for Major System New Start (JMSNS). When AMC estimates that the anticipated cost to fulfill a mission need exceeds \$200 million in RDT&E or \$1 billion (FY80 dollars) in procurement, or the program is otherwise designated for DoD-level review, a JMSNS is prepared to describe the mission need and to justify program initiation. The JMSNS is a problem-oriented rather than solution-oriented document.

Letter of Agreement (LOA). An LOA is prepared to insure agreement between TRADOC, as the combat developer, and AMC, as the materiel developer, on the nature and characteristics of a Proposed System and the investigations needed to develop and validate the system concept. The LOA defines system-associated operational, technical, personnel, manpower, safety, health, human factors, energy consumption, training, and logistics support concepts.

Required Operational Capability (ROC). The ROC states concisely the minimum essential operational, technical, personnel, manpower, safety, health, human factors engineering, training, logistic, and cost information necessary to initiate the Full-Scale Development Phase or procurement of a materiel system.

Table C-1. Systems Analysis

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
1. Functional Requirements Information	List of system missions	All addressed to varying degrees in: MAA O&O JMSNS LA ROC see also: Statement of Work within the system RFP	AMC, Att: DRCDE-A TRADOC, Att: ATCD-E	See pages C-1 and C-2
	Mission scenario			
	Weapon system requirements			
	Description of system constraints, guidelines, and goals			
2. Design	Projected operational environments	Project Office	Procuring Agency, PM, TSM	Military and non-profit
	Functional requirements			
	Acquisition schedule			
	Description of Predecessor System			
	Description of BCS subsystems			
	Description of new technologies			
		Operations and technical manuals	Procuring Agency	
		Operations and technical manuals	DTIC, Contractors	
		Engineering studies, SMEs, R&D studies	Laboratories within the Materiel Development Command	
		Feasibility and concept exploration studies	System Command HQ (Naval Air/Sea/Electronics/etc. Systems Command)	



Table C-2. Workload Elements

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
1. Planned Maintenance (PM)	<u>ARMY</u> Army PM data	System-specific technical manuals Sample Data Collection (SDC) Maintenance Action/Allocation Charts (MAC)	TRADOC proponent schools, libraries	
	<u>NAVY</u> Ship PM skill levels and man-hours	Navy Manpower Requirements Data System Base/Maintenance Standards Data Base	NAVMACCLANT	NAVMACCLANT is responsible for Navy maintenance standards; POC: Dan Lowe or Terry Fresheim
	PM for ship system/equipment	Ships' 3M system, planned maintenance subsystem MRC	NMISO  SPCC, NMISO Dept.	See OPNAVINST 4790.4, Vol I  By system/equipment, task frequencies, skills required, number of personnel required
	PM by equipment/system	Technical manuals  Navy training manuals	CNM Naval Sea Systems Command, Wash., D.C. SEA6G, 3M Branch  CNO Deputy CNO for Logistics OP43, Ships' Maintenance and Modernization Div.	The acquisition managers for all Navy systems except air; POC: Harry Felsen

Table C-2. Workload Elements [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
2. Corrective Maintenance (CM)	Deferred shipboard PM/aviation PM/maintenance or overhaul tasks beyond capability of ship's force	3-M	NMSO Norfolk, VA	Call NMSO directly
		Current ships' maintenance plan	SPCC, NMSO Dept.	Detailed field usage data on all Navy systems reported; excellent source of R&M data; available on tape; consult Catalog of Reports
	<u>ARMY</u> Army CM data	SDC	TAMMS, AR 750-37 Proponent: DCSLOG	
	<u>NAVY</u> Selected aviation system/equipment CM (air and surface)	LSAR	MRSA	LSAR is applicable to all services' PM & CM
	Submarine CM	Naval Aviation 3M System Information Reports for designated system	Navy Ships' Parts Control Center, NMSO Detachment, 5450 Carlisle Pike, P.O. Box 2020, Mechanicsburg, PA 17055	See SPCCINST 4790.4
	Selected ship CM system/equipment	Ships' 3M System Information Reports		See NAMSOINST 4790.2

Table C-2. Workload Elements [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Ships' Weapons Systems CM	WQEC RAM Report System	WQEC, Weapons Station, Concord, CA	Selected system/equipment reports in prepared formats; excellent source of data; POC: Don Ortman or Rosemary Cassell
	<u>AIR FORCE</u> Air Force CM data	Maintenance Management System AFM 66-1	Air Force Logistics Command	Detailed fielded usage data on all Air Force systems reported; excellent source of R&M data; on microfiche and tape

Table C-3. Manpower Requirements Determination

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
1. Personnel Selection and Classification	Enlisted OMP and MOSS	AR 611-201, Enlisted OMP and MOS	DA Proponent: SSC att: AT21-NCR	Issued annually, updated as required
2. Individual Work Capacity	Manpower Authorization	AR 570-2DA, Organization and Equipment Authorization Tables: Personnel	DSCPER	Modifications to factors in paragraph 2-6 must first be approved by the agency or office having authority over the system under study

Table C-4. Personnel

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
1. Army Personnel Transition Rate	Promotion and Attrition Rates for Army MOS and CMF	Army Enlisted Master Record	DoD - Defense Manpower Data Center (DMDC)	Data may be obtained in tape format. A letter should accompany the request describing the type of information needed and in what format. May take 1-3 months to procure.
2. Army Personnel Trainees, Holders, and Students (TTHS) Rates	Army TTHS rates	COPO 45 Report	MILPERCEN Att: DAPC-PST-IQ  MILPERCEN Att: DAPC-PSD-O	Available in microfiche or tape format on a monthly basis. Contractors should note that an official request must be initiated through their designated program office.

Table C-5. Training

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
1. Task Information	<u>ARMY</u> Enlisted tasks by MOS and skill levels	STP: SM TG Job Books	Proponent TRADOC school; AGPC-Baltimore; TDIS, att: ATIC-SMD-PE	Use DA Pam 310-1 to identify STPs
	Operator tasks by system	FMs; Operator TMs	Proponent TRADOC school; AGPC (FM-Baltimore, TM-St. Louis)	Operator TM numbers end with 10 or 20; TMs for weapon systems are identified in DA Pam 310-1 by LIN
	Maintenance tasks by system	Maintenance TMs; SDC	Proponent TRADOC school; proponent AMC commodity command; AGPC-St. Louis	Maintenance TM numbers end with 12, 20, 34, etc. The organizational maintenance manual (usually -20) contains the MAC; TMs for systems are identified in DA Pam 310-1 by LIN
	Collective tasks by unit Tasks by MOS, skill level, and duty position	ARTEP CODAP	Proponent TRADOC school; AGPC-Baltimore SSC-NCR	Use DA Pam 310-1 to identify ARTEPs Consult the AOSP handbook for a description of the CODAP and for instructions on how to obtain MOS surveys; nearly all CODAP tasks are identical to those in SMS and TGs

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Logistic tasks for developing system	LSAR output: LSA-02, LSA-11, LSA-14	ILS Manager in PM's office	These tasks are extremely numerous, detailed, and do not track well with training tasks
	Training tasks for developing system	Documentation produced by contractor performing FEA	Assigned office in DOTD of Proponent TRADOC school; TRADOC TSM's office	Typically, the purpose is to identify training requirements for CFE only
	<u>NAVY</u> Tasks accomplished by rate/rating/NEC/duty position	NOTAP	NODAC, Washington Navy Yard, Washington, DC	Navy occupational analysis program data are similar to the Army CODAP data; Navy task data tend to be much more general
	Maintainer tasks by rate/rating/NEC/system	MRC	SPCC, NMSO Dept.	Contains detailed, proceduralized descriptions of maintenance tasks
	Maintainer tasks by rate/rating/NEC/system	3M System Information Reports	NMSO	Contains historical record of maintenance actions performed; typically, these tasks do not track well with training tasks
	Logistics tasks for developing system	LSAR output: LSA-02, LSA-11, LSA-14	ILS Manager in PM's office	LSAR procedures and programs are the same throughout DoD

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
2. Course Information	Enlisted tasks by rate/rating/NEC/weapon system	NEPDIS	CNMPC	This system is relatively new and has the potential to provide much of the task data not presently available
	<u>AIR FORCE</u> Tasks performed by AFSC, skill level, and duty position	CODAP	AFMPC-Randolph AFB, Texas	The Air Force is developer of CODAP; the Army's computer programs are similar to the Air Force's
	Logistics tasks for developing system	LSAR output: LSA-02, LSA-11, LSA-14	ILS Manager in PM's office	LSAR procedures and programs are the same throughout DoD
	Maintainer tasks by AFSC, skill level, and system	Maintenance Management	AFLC	Descriptions of this system are found in AF Reg 66-1
	<u>ARMY</u> Course outlines	POI	Proponent TRADOC school	When obtaining POIs, also request copies of TRADOC Form 377-R (ICH Computation Worksheet and Summary)
	Synopsis of current formal school courses	DA Pam 351-4	TRADOC or AMC Technical Library; AGPC-Baltimore	Course descriptions are very brief; descriptions tend to become outdated quickly



Table C-5. Training [cont.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Course pipelines	DA Pam 351-9	TRADOC or AMC Technical Library; AGPC-Baltimore	Provides a good listing of course sequences for each enlisted MOS; sequences tend to become outdated quickly
	Course pipelines	AR 611-201	AGPC-Baltimore	Provides a list of all courses in the EPMS; only courses Skill Level 2 or higher are included; an appendix also identifies courses required for the award of an ASI
	Synopsis of planned courses	ICTP	TSM or, if none, Combat Developer at Proponent TRADOC school	Usually the best source for identifying current plans for supporting a new system's course requirements
	<u>NAVY</u> Synopsis of current formal school courses	CANTRAC, NAVEDTRA 10500 ;	NAVEDTRA; technical library	Produced on microfiche; is comparable to the Army Formal Schools Catalog; on-line data base; very useful information

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Course outlines for "A" and "C" schools	Curriculum Outline with Master Schedule	Proponent Navy school; CNTECHTRA	"A" schools are not comparable to Army basic training; they represent basic technical training that prepares a sailor to attend a more advanced "C" school; as a result, it is difficult to analyze Navy courses with respect to comparable Army courses
	Course outlines for "F" schools	Curriculum Outline with Master Schedule	Proponent Navy school; CONTRALANT; CONTRAPAC; and/or CNATRA	"F" schools, typically short in length, are conducted by Navy operational commands; each course has a specific focus and deals with only one type of equipment or functional area; go directly to the commands
	Course pipelines	NAVPERS 18068D	Technical library	Provides an appendix that identifies every course required for an NEC
	<u>AIR FORCE</u> Synopsis of formal school courses Course outlines	AFR 50-5 POI	Technical library Proponent Air Force school	Comparable to Army Formal School Catalog

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
3. Training Cost and Resource Information	Course pipelines	AFR 39-1	Technical library	Provides a very useful diagram of the courses for each AFSC
	<u>MARINE CORPS</u>			
	Synopsis of current formal school courses	MCO P1500.12	Technical library	Comparable to Army Formal Schools Catalog
	Course outlines	POI	Proponent school	Most formal school training for the Corps is conducted by the other services
	Course pipelines	MCO P1200.70	Technical library	Lists all courses required for a Marine Corps MOS
	<u>ARMY</u>			
	Detailed enlisted and officer course cost reports	ATRM-159	TRADOC HQ DCS Resource Management: ATRM-R	Develops the best course cost data available in the Army but lags 1.5 to 3 years behind the current year
	Aggregated enlisted and officer course costs by MOS/ASI	MOSB	Office of the Comptroller of Army Cost Analysis Division: DACA-CAD	Depends on input from ATRM-159; provides a good total picture of incremental course costs of an MOS/ASI

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Instructor determination data: Course Type, Optimum Class Size, ICH	Data base maintained by TRAMEA	TRADOC HQ DCS Resource Management ATRM-S	This data base contains up-to-date instructor determination data on all Army courses; data are input by TRAMEA teams located at each TRADOC school
	Existing training devices	DA Pam 310-12	Technical library; AGPC-Baltimore	Provides a general description of Army training devices; tasks to be taught using the device are supposed to be listed, but many devices do not have tasks identified
	Existing training devices	TRADOC Pam 71-9	Technical library	This catalog describes training devices produced by TASC or acquired through commercial sources; generally, these devices are small in cost and scope
	Planned/developing training devices	US Army Comprehensive Plan for Training Devices	ATSC: ATIC-DST-PM	Many fielded devices are also included; format is a computer-based report which has potential to hold a great deal of useful training device data; the data are often incomplete and published irregularly

Table C-5. Training [con't.]

SUBJECT	DATA	SOURCE	SOURCE LOCATION	COMMENTS
	Existing training devices, audiovisual programs, graphic training aids, video tapes, etc.	AETIS	ATSC: ATIC-ETO	Excellent source for identifying training materials that support particular MOSS
	Motion pictures and related audiovisual aids	DA Pam 108-1	Technical library; AGPC-Baltimore	
	Video tapes	TRADOC Reg 350-33	Technical library	
	Programmed Instruction	DA Pam 690-22	Technical library; AGPC-Baltimore	
	Correspondence courses	DA Pam 351-20	Technical library; AGPC-Baltimore	
	Extension training materials	DA Pam 350-100	Technical library; AGPC-Baltimore	
		Extension training material catalogs by ARTEP, DA Pam 350-XXX-X	Technical library; AGPC-Baltimore	
	<u>NAVY</u>			
	Existing training devices	Directory of Naval Training Devices	Technical library; NTEC-Orlando, Florida	
	<u>AIR FORCE</u>			
	Audiovisual materials	AFR 95-1	Technical library	Provides a one-source list of ETMs for all organizations other than TOE units
				Unit-specific catalogs of ETMO for each ARTEP
				Navy's version of DA Pam 310-12

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## DSI Acronyms and Abbreviations

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AETIS	Army Extension Training Information System
AFB	Air Force Base
AFLC	Air Force Logistics Command
AFMPC	Air Force Military Personnel Center
AFM	Air Force Manual
AFM 66-1	AF Maintenance Management
AFR	Air Force Regulation
AFR 39-1	Airman Classification Regulation
AFR 50-5	USAF Formal Schools Catalog
AFR 95-2	USAF Audio-Visual Resources & Functions
AFSC	Air Force Specialty Code
AGPC	Adjutant General Publications Center
AMC	Army Materiel Command
AOSP	Army Occupational Survey Program
AR	Army Regulation
AR 570-2DA	Organization & Equipment Authorization Tables: Personnel
AR 611-201	Enlisted CMF & MOS
AR 750-37	Sample Data Collection, The Army Maintenance Management System
ATSC	Army Training Support Center
ATRM	Army Training Resource Management
ATRM-159	MOS Course Cost Report
ARTEP	Army Training and Evaluation Program
CANTRAC	Catalog of Navy Training Courses
CFE	Contractor-Furnished Equipment
CODAP	Consolidated Occupational Data Analysis Program
CNATRA	Chief of Naval Air Training
CNET	Chief of Naval Education and Training
CNM	Chief of Naval Materiel
CNMPC	Chief of Naval Military Personnel Command
CNO	Chief of Naval Operations
CNTECHTRA	Chief of Naval Technical Training
COMTRALANT	Commander of Training, Atlantic
COMTRAPAC	Commander of Training, Pacific
COPO 45 Report	Chief of Personnel Operations

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## Appendix C

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DA	Department of the Army
DA Pam 108-1	Index of Army Motion Pictures and Related Audio-Visual Aids.
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms
DA Pam 310-12	Index and Description of Army Training Devices
DA Pam 350-100	Consolidated MOS Catalog
DA Pam 350-XXX-X	Extension Training Materials (series)
DA Pam 351-4	US Army Formal Schools Catalog
DA Pam 351-9	EPMS Master Training Plan
DA Pam 351-20	Army Correspondence Courses
DA Pam 690-22	Guide for Using Existing Programmed Instructional Materials
DCS	Deputy Chief of Staff
DCSPER	Deputy Chief of Staff for Personnel
DOTD	Directorate of Training & Doctrine
DTIC	Defense Technical Information Center
EPMS	Enlisted Personnel Management System
ETM	Extension Training Materials
FEA	Front-End Analysis
FM	Field Manual
ICH	Instructor Contact Hours
ICTP	Individual and Collective Training Plan
ILS	Integrated Logistic Support
JMSNS	Justification for Major System New Start
LIN	Line Item Number
LOA	Letter of Agreement
LSA-02	Personnel & Skill Summary
LSA-11	Special Training Device Requirements
LSA-14	Task Inventory
LSAR	Logistic Support Analysis Record

MAC	Maintenance Action/Allocation Chart
MCO P11200.7D	MOS Manual
MCO P1500.12	Marine Corps Formal Schools Catalog
MOS	Military Occupational Specialty
MOSB	MOS Cost Training Handbook
MOSC	Military Occupational Specialty Code
MRC	Maintenance Requirements Cards
MRSA	Materiel Readiness Support Activity
NAVPERS	Navy Personnel
NAVPERS 180068D	Manual of Navy Enlisted Manpower & Personnel Classification and Occupational Standards
NAVEDTRA	Naval Education & Training
NAVEDTRA 10500	Catalog of Navy Training Courses(CANTRAC)
Navy 3M	Navy Materiel Maintenance Management
NEC	Naval Enlisted Classification
NEPDIS	Navy Enlisted Professional Development Information
NITRAS	Navy Integrated Training Resources and Administration System
NMSO	Navy Maintenance Support Office
NMSOINST 4790.2	Integrated Logistic Support Instruction
NODAC	Navy Occupational Development and Analysis Center
NOTAP	Navy Occupational Task Analysis Program
NTEC	Naval Training Equipment Center
NTP	Navy Training Plans
O&O	Operational and Organizational Plan
OPNAVIST 4790.4 (series)	Ship's Maintenance & Materiel Management Program
Pam	Pamphlet
PM	Program Manager
PM TRADE	Project Manager for Training Devices
POI	Program of Instruction
PQS	Position Qualification Standards
R&D	Research & Development
ROC	Required Operational Capability



## Appendix C

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SDC	Sample Data Collection
SM	Soldier's Manual
SPCC	Ships' Parts Control Center
SPCCINST 4790.4	3M Naval Aviation System Information Reports
SQT	Skill Qualification Tests
SSC-NCR	Soldier Support Center—National Capitol Region
SSI	Specialty Skill Identifier
STP	Soldier Training Publications
SUBLANT/	Submarines Atlantic/
SUBPAC	Submarines Pacific
TAMMS	The Army Manpower Management System
TASC	Training & Audiovisual Support Center
TASO	Training Aides Services Office
TDIS	Training Development Information System
TG	Training Guide
TOE	Table of Organization and Equipment
TRADOC	Training and Doctrine
TRADOC Pam 71-9	Catalog of TASO Training Devices
TRADOC Form 377-R	ICH Computation Worksheet & Summary
TRADOC Reg 350-33	Educational Video Tape Catalog
TRAMEA	TRADOC Management Engineering Activity
TSM	TRADOC Systems Manager

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## APPENDIX D Glossary

Action Rate The preventive maintenance action rate measured as the number of occurrences (i.e., demand) per life unit (calendar/clock time, miles/kilometers traveled, rounds fired or number of activations); (paraphrased from AR 570-2).

Additional Skill Identifier (ASI) A code added to the specialty/MOS to designate greater specialization (AR 351-1). For example, soldiers with either 11B, 12B, 19D MOS who receive Dragon Gunnery Training are assigned the ASI C2.

Administrative Time POI time allotted for administrative functions as opposed to course/training related functions.

Advanced Individual Training (AIT) Skill training given enlisted personnel after completion of basic training, so as to qualify them for the award of an MOS and to perform the basics of their job upon initial assignment to a unit (AR 351-1).

Noncommissioned Officer Course (ANCOC) A course that stresses MOS-related tasks with emphasis on technical and advanced leadership skills, and knowledge of military subjects required to train and teach other soldiers at the platoon and comparable level (AR 351-1).

Annex Logical divisions in a program of instruction (POI) that cluster tasks into blocks of instruction. Within each annex are lessons (identified by file numbers) which are designed to instruct the tasks.

Annual Accessions The number of individuals who must be recruited in a year.

Annual Costs Total cost of training computed on an annual basis.

Annual Course Costs Total course cost and individual course cost elements computed on an annual basis.

Annual Course Resources Products of Training Cost and Resources. Include number of instructors required, training cost, and training man-days.

## Appendix D

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Annual Instructor Requirements The number of instructors required to deliver all convenings of a course in a year.

Annual Training Man-Day Requirements Number of man-days per year that soldiers will be receiving a course of instruction and be unavailable for assignment to other duties.

Attrition Rate The rate at which individuals leave the Army at each paygrade within each MOS.

Audit Trail A systematic mechanism for tracking development of MPT requirements and for monitoring changes to the data, assumptions, or procedures which produce the MPT requirements.

Availability Ratio An estimate of availability of an MOS to support a Proposed System.

Base Operations Cost Cost to the base operations functional account adjusted by the total number of training man-weeks.

Baseline Comparison System (BCS) A current operational system, or a composite of current operational subsystems, which most closely represents the design, operational, and support characteristics of the new system under development (MIL-STD-1388-1A).

Basic Combat Training (BCT) Fundamentals of basic infantry combat given to enlisted Active Army and Reserve personnel without prior military service (AR 310-25).

Basic Noncommissioned Officer Course (BNCOC) A course that prepares career soldiers in Grade E5 (Skill Level 2) for duties at grade E6. Performance-oriented training is stressed (AR 351-1).

Basic Technical Course (BTC) A course that focuses on training critical tasks listed in the Skill Level 3 Soldier's Manual for a given MOS (AR 351-1).

Basis of Issue Plan (BOIP) A plan which indicates the quantity of new or modified equipment planned for each type organization and the planned changes to personnel and supporting equipment (AR 70-27).

Bill Payer An older system that is currently consuming MPT resources and that will be phased out of the inventory upon introduction of the new system.

Career Management Field (CMF) A list of operator or maintainer Military Occupational Specialties for one functional branch area.

Class Frequency Average number of times a Program of Instruction is offered each year (averaging across locations).

Class Length Length of a course of study, usually stated in weeks.

Comparability Analysis Process by which estimates of the human resource requirements of an emerging weapon system are derived from the known requirements of similar operational systems and subsystems.

Comparable Task The task closest to a new task in terms of task criticality and similarity to type or class of task.

Corrective Maintenance (CM) All actions performed as a result of failure to restore an item to a specific condition (MIL-STD-1388-1A).

Cost and Training Effectiveness Analysis (CTEA) The sole Army process used to assess the training cost and effectiveness of developing weapon systems.

Course Attrition The number of students failing to graduate from a course of instruction.

Course Number An alphanumeric code used to designate a Program of Instruction.

Course Module A component instruction which teaches a specific task; can exist at course, annex, or file level.

Course, System-Specific (1) The Advanced Individual Training (AIT) and Additional Skill Identifier (ASI) courses for all MOSs assigned to equipment in the Predecessor, Baseline Comparison, and Proposed Systems; and (2) the Noncommissioned Officer Education System (NCOES), warrant and commissioned officer courses providing direct instruction on system-specific equipment.

Crew Maintenance Maintenance actions that are performed by the personnel whose principal duty is operation of a system.

## Appendix D

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Critical Resources The implementation or management risk associated with the introduction of a new system. This risk involves manpower, personnel, and training demands created by the new system compared to the present or projected supply.

Data Management Structure A systematic, consistent method of organizing information.

Delta The Greek letter; symbolizes an expected change in the manpower, personnel, and training requirements cited in output reports.

Dependency The relationship (dependency) between a specific maintenance action and a specific metric. For example, maintenance actions associated with automobiles usually depend on the number of miles driven, maintenance associated with an artillery tube depends on rounds fired, and electronic equipment depends on hours operated.

Depot Maintenance Maintenance involving the overhaul of economically repairable materiel to augment the procurement program in satisfying the overall Army requirements and when required to provide for repair of materiel beyond the capability of general support maintenance organizations (AR 310-25).

Design Differences Differences in design between projected equipment and comparable existing equipment used in the Baseline Comparison System.

Design Freedom The absence of a detailed design at the beginning of a weapon system's development.

Direct Cost Operational and Maintenance, Army (OMA), Military Personnel, Army (MPA) and Procurement Account (PA) cost elements that are directly contributable to the cost per graduate for a specific course or group of courses. The following direct costs are listed in TRADOC Cost Analysis Program Reports (MOS Training Costs), ATRM-159 (R1): direct mission, troop support, ammunition, equipment item depreciation, student pay and allowances, travel pay to course, per diem at course.

Direct Maintenance Effort expended by maintenance personnel in the actual performance of maintenance on the hardware in accordance with the prescribed procedures contained in the applicable technical manuals (DA PAM 700-127).

Direct Mission Cost Operational and Maintenance, Army (OMA) and Military Personnel, Army (MPA) cost of the instructional department's costs, plus the flying hours costs plus any other costs all computed on a per graduate basis. Algorithms for computing these costs are contained in Cost Analysis Program Reports (MOS Training Costs) ATRM-159 (R1) documents.

Direct Support Maintenance (DS) Normally authorized and performed by designated maintenance activities in direct support of using organizations. This category of maintenance is limited to the repair of end items or unserviceable assemblies in support of using organizations on a return to user basis (AR 310-25).

Duty Position A group of closely related tasks and responsibilities which are normally assumed by one individual (AR 310-25).

End-Item Equipment A final combination of end item products, components, parts and/or materials that is ready for its intended use, e.g., ship, tank, mobile machine shop, aircraft (MIL-STD-1388-1A).

Engineering Comparability Analysis A structured analytic process utilizing principles of reliability/maintainability (R/M) engineering, logistics engineering, industrial engineering, and statistical extrapolation to predict the reliability and maintainability of new systems based upon the R/M characteristics of existing systems.

Environmental Variables Environmental factors such as heat, cold, snow, mud, desert conditions, etc., which may impact the operating scenario of the proposed weapon system.

Equipment Depreciation Cost Cost of equipment dedicated to a course, non-dedicated departmental equipment, and school overhead equipment amortized over a ten-year period and applied to Course Cost.

Equipment Identification Code (EIC) An alphanumeric coding scheme used to identify specific pieces of equipment. May equate to Functional Group Codes, Work Unit Codes, or Logistic Support Analysis Record numbers.

File The lessons within an annex of a program of instruction (POI) in which tasks are taught.

## Appendix D

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First Unit Equipped (FUE) The first troop unit to be equipped with the first production items/systems (DA PAM 700-127).

Footprint The resources of an earlier system within which a new system must fit or closely match.

Frequency The number of times the task is performed per period of time.

Front-End Analysis The process of assessing what impacts the manpower, personnel, and training requirements of an emerging system will have on present and projected resources.

Function A broad category of activity performed by a man-machine system (Draft MIL-STD on Task Analysis, Feb. 1980). For example, upper level functions of a self-propelled howitzer would be to shoot, move, and communicate. The requirement to shoot would have lower level functions such as direct and indirect fire.

Functional Allocation The categorization of the activities (functions) performed by a man-machine system into who or what will perform them. The performance categories include hardware, software, human (operator, maintainer, or support), or a combination of these.

Functional Group Code (FGC) A standard indexing system which parcels the weapon system into its functional systems, subsystems, components/assemblies, and parts.

Functional Hierarchy Functional structure which first identifies the major functions and subsequently each of the lower level functions a system is expected to perform. These functions are arranged in a hierarchical structure to aid in the identification of components from which lower level functions and their sequence are determined and described.

Functional Requirements Functions or activities required of a proposed weapon system. These required functions are developed and stated in DoD and Army threat studies, mission area analyses, how-to-fight manuals, use studies, and system concept papers.

General Support Maintenance (GS) The maintenance authorized and performed by designated Table of Organization and Equipment (TOE) and Table of Distribution and Allowance (TDA) organizations in support of the Army Supply System. Normally, these organizations will repair or overhaul materiel to required maintenance standards in a ready-to-issue condition based upon applicable supported Army area supply requirements (AR 310-25).

Generic System A description of the general configuration of equipment, software, and duty positions required to fulfill all system functional requirements stated in Army Mission Area Analyses and System Concept Papers.

Hardware Function An activity (function) accomplished principally by the equipment.

High Driver A system element which consumes a large proportion of MPT resources.

Indirect Cost A cost which, because of its incurrence for common or joint objectives, is not readily subject to treatment as a direct cost (AR 310-25).

Indirect Maintenance Also stated as Indirect Productive Time (IPT); the time required for normal performance of the maintenance tasks but that does not in and by itself result in the total time required to accomplish the tasks. Indirect maintenance will not exceed a ratio of 1 to 0.4 (direct to indirect) for organizational and direct support maintenance. For general support, indirect maintenance will not exceed a ratio of 1 to 0.22 (direct to indirect).

Individual and Collective Training Plan (ICTP) The primary resource and planning document for developing training subsystems for new Army systems. The ICTP describes the integration of training subsystems into the development of the total system as well as integration of the developing system into ongoing training programs.

Individual Work Capacity The available productive man-hours (available for MOS duties). Excludes all non-available time factors such as security, kitchen patrol, work details, messing, casualties, personal needs, and unit movement (AR 570-2).

Induced Maintenance See Unscheduled Maintenance, Induced.

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## Appendix D

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Inherent Maintenance See Unscheduled Maintenance, Inherent.

Instructional Department Cost Includes Operations and Maintenance, Army (OMA) and Military Personnel, Army (MPA) costs of the academic department's cost per graduate. It also includes pay and allowances of instructors and academic department staff, consumable supplies and equipment, and contractual services. The method used to compute Instructional Department Cost can be found in the Cost Analysis Program (MOS Training Costs) documents [ATRM-159 (R1)].

Instructional Systems Development A systems engineering approach to developing a training program based on task analysis. ISD includes five phases: analyze, design, develop, implement, and control.

Instructor Contact Hours (ICH) Instructor manhours required to present course material and to provide assistance to students during the actual presentation of course of instruction (DA PAM 570-558).

Intake to Paygrade The number of individuals who must be assessed or promoted into a paygrade.

Line Item Number A number identifying the position which end-line equipment or a component thereof holds in the equipment hierarchy.

Logistic Support Analysis An analysis supplied during the acquisition process in order to insure supportability and other Integrated Logistic Support (ILS) objectives. The analysis consists of iterative definition, synthesis, tradeoff, and test/evaluation (MIL-STD-1388-1A).

Maintainability A system's or its component's requirement for maintenance, both planned and corrective determines its maintainability. Maintainability is a product of the frequency of planned maintenance actions and corrective maintenance actions multiplied by the time these actions take to complete.

Maintenance, Corrective See Corrective Maintenance.

Maintenance Level The four basic levels of maintenance into which maintenance activity is divided. They include organizational, direct support, general support, and depot. (DA PAM 700-127).

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Maintenance Manhours Per Maintenance Action A measure of the maintainability parameter related to item demand for maintenance manpower: the sum of maintenance man-hours divided by the total number of maintenance actions (preventive and corrective) during a stated period of time (MIL-STD-721C).

Maintenance, Preventive See Preventive Maintenance.

Maintenance Ratio A measure of the total maintenance manpower burden required to maintain a system. It is expressed as the cumulative number of manhours of maintenance expended in direct labor during a given period of time divided by the cumulative number of end items' operating hours during the same time (DA PAM 700-127).

Manpower The total demand, expressed in terms of the number of individuals, associated with a system. (MIL-STD-1388-1A). Includes the number of individuals in each MOS/ASI, skill level, and paygrade required to operate and maintain a system.

Manpower Losses Per Year Losses in productive manpower at each paygrade in an MOS due to promotion, attrition, and application of the Transients, Trainees, Holdees, and Students (TTHS) percentage to the manpower requirements over the course of a year.

Manpower Requirements An emerging weapon system's qualitative and quantitative manning needs.

Manpower Requirements Criteria (MARC) The manpower requirements of positions for Army units as defined in AR 570-2.

Mean Time to Repair (MTTR) A basic measure of maintainability. MTTR is calculated by summing corrective maintenance actions times for a particular item and dividing this sum by the total number of failures of that item at a specified maintenance level.

Military Occupational Specialty (MOS) A group of duty positions that require closely related skills such that a person qualified in one duty position in an MOS can, with adequate on-the-job training (OJT), perform in any of the other positions that are at the same level of difficulty.

## Appendix D

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Military Occupational Specialty Code (MOSC) A specific occupational identification identifying type and level of skill, level of proficiency, and/or scope of responsibility (AR 611-201); stated in terms of MOS and skill level.

Military Personnel, Army (MPA) An appropriation that provides for pay, allowances, individual clothing, subsistence, interest on deposits, gratuities, permanent change of station travel, per diem portion of temporary duty travel between permanent duty stations for members of the Army on active duty and military academy cadets. Also includes expenses of apprehension and delivery of deserters, prisoners, and members absent without leave (AR 37-100-80).

Mission A clear, concise statement of a task or tasks to be accomplished.

Mission Area A broad subdivision of the Army's overall mission, which is to prepare for, engage in, and win land wars.

Mission Area Analysis Process by which a threat is analyzed and a counter to this threat (i.e., the mission) is postulated. The mission is stated in the Mission Area Analysis's Studies and System Concept Papers.

Characteristics Threat and environment impacts define specific mission characteristics. Frequently, mission characteristics require specific performance requirements of a system.

Mission Name Name assigned to a specific mission that a system is expected to accomplish. For example, Defeat Enemy Armor is a mission that could be assigned to armored units, aviation units, and infantry equipped with anti-armor systems.

Mode/Concept Details the maintenance concept, organizational concept, and the operational mode/concept proposed for a system. Firing 40 rounds per hour, moving three times a day, fixing forward, and performing all organizational maintenance actions within 30 minutes are examples of modes and concepts.

New Technologies The additional technologies (in addition to technologies incorporated in current systems) that a system needs to meet stated performance requirements.

Normalized Graduates The number of students who satisfactorily completed the course (graduate), as adjusted for carryovers. Norm grads equal the number of actual grads minus one-half the number of students in training in the beginning of the fiscal year plus one-half the number of students in training at the end of the fiscal year.

Number of Acquisitions The total number of systems to be purchased. Includes TOE as well as systems purchased for Reserve Forces and operational floats. Also includes systems purchased to be pre-positioned but not manned.

One-Station Unit Training (OSUT) Training conducted at one location; includes both basic and advanced individual training for combat arms MOS and selected combat support MOS. Training is conducted in one unit with the same cadre and one program of instruction (POI) (AR 351-1 and PM 25-1).

Operating Strength The present and absent strength of an organization classified under the item "personnel status" of the morning report heading as "permanent party". Does not include "intransit" strength (AR 310-25).

Operational Environment Characteristics Environmental and operational factors that will impact the operating scenario of the proposed weapon system. Includes environmental variables as well as operational and scenario dependent variables such as smoke, NBC, and night operations.

Operational Manning (OM) The number of personnel required to operate a system in an operational environment.

Operations and Maintenance, Army (OMA) An appropriation that provides for the operation and maintenance of all organizational equipment and facilities of the Army; procurement or requisite equipment and supplies; production of audiovisual instructional materiel and training devices; operation of service-wide and establishment-wide activities; operation of depots, schools, training, and programs related to the operation and maintenance of the Army (AR 37-100-80).

Optimum Class Size The number of students designated for a class which, due to instructional considerations, is considered optimum.

Organizational Maintenance (ORG) Maintenance authorized for and performed by a using organization on its own equipment (AR 310-25).

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## Appendix D

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Paygrade (PGD) The statutory paygrade established in the Career Compensation Act of 1949, as amended (AR 310-25).

Per Diem at Course The students' daily expenses which are costed for courses that are less than twenty weeks in length [ATRM-159 (R1)].

Performance Measure The qualitative description of how the function's performance will be assessed.

Performance Standard An established number of man-hours needed to accomplish a unit of work (AR 310-25).

Period Reported The period of time, in days, that the system is to maintain continuous operation and for which workload and manpower requirements are to be determined.

Personnel Flow Rates The rates of progression of individuals through the military personnel system. Includes promotion, attrition, and TTHS rates.

Personnel Pipeline The personnel structure that must be maintained to insure that required manpower requirements are met.

Personnel Requirements The number of people who must be carried in a personnel pipeline to satisfy stated manpower requirements. This number must also offset manpower losses that result from attrition, advancement, and non-availability.

Perturbation Value A quantitative representation of the impact of the design differences between the Baseline Comparison System and the Proposed System.

Phased Schedule A schedule that lists the number of new systems to be placed in service per year.

Planned or Estimated Schedule The planned or estimated schedule for a new system progressing through the acquisition process.

Predecessor System An Army system that is performing mission(s) that will eventually be performed by the new system.

Prepositioned Materiel Configured to Unit Sets (POMCUS) Equipment that has been procured but is held, unmanned, in readiness for future use.

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Preventive Maintenance (PM) All actions performed in order to retain an item in specified condition. Involves systematic inspection, detection, and prevention of incipient failures (MIL-STD-1388-1A).

Primary Leadership Course (PLC) A leadership, supervisory, and management course built around the environment in which combat support/combat service support leaders perform their duties (AR 351-1).

Primary Noncommissioned Officer Course (PNCOC) A non-MOS specific, field-oriented course built around basic soldier skills and tasks that prepares E4 soldiers for duties at the E5 level (AR 351-1).

Primary Technical Course (PTC) A course that focuses on training critical tasks listed in the Skill Level 2 Soldier's Manual for a given MOS. Training is provided in resident and extension modes.

Procurement Appropriation (PA) Five continuing (multi-year) appropriations that provide funds for procurement, manufacture, and conversion of major items of combat and support equipment, including ammunition, aircraft, missile systems, weapons, combat and support vehicles.

Program of Instruction (POI) The training management document that specifies the purpose, prerequisites, content, duration, and sequence of instruction for normal resident and non-resident courses (AR 310-25).

Promotion Rate The rate at which individuals advance from one paygrade to another.

Proposed System An analytic construct used to determine the functional requirements of a new system. It incorporates the technological advances likely to exist before the system's projected initial operational capability date.

Quasi-Program of Instruction A partial program of instruction designed to evaluate the impact of emerging system designs on existing courses of instruction. It also helps determine requirements for new courses of instruction.

Reliability Can be defined as (1) the duration or probability of failure-free performance under stated conditions, or (2) the probability that an item can perform its intended function for a specified interval under stated conditions (MIL-STD-1388-1A).

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## Appendix D

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Reliability, Availability, Maintainability (RAM) A measure of reliability or maintainability that includes the combined effects of item design, quality, installation, environment, operation, maintenance, and repair (AR 702-3).

Replacement Year Year when the predecessor system is scheduled to be totally replaced by the new system.

Scope See Scope, System.

Scenario A brief description of the theater, environment and threat factors that are likely to be associated with the system missions.

Scenario Usage Rate The utilization rate that is the planned or actual number of life units expended or missions attempted during a stated interval of time (MIL-STD-721C). Life unit is the duration of applicable use, i.e., operating hours, cycles, distance, rounds fired.

Scheduled Maintenance Preventive maintenance performed at prescribed points in the item's life (MIL-STD-1388-1A).

Scheduled Unit Training Training of an entire unit that occurs at regularly scheduled times. Unit training provides reinforcement of previous training as well as new training in group and unit tasks.

Self-Study Individual study by which the soldier learns new skills or reinforces skills already learned (AR 350-1).

Senior Noncommissioned Officer Course (SNCO) Senior level training that prepares soldiers in grades E8 and E9. It consists of resident and extension training as well as on-the-job experience (AR 351-1).

Sergeants Major Academy (SGMA) The capstone of enlisted training. Master and first sergeants (E-8) are prepared for high-level responsibilities in both troop and senior staff assignments (AR 351-1).

Service School Institutional training, either individual or collective, conducted in Army schools or Army training centers; uses instructional systems development materials.

Skill Level (1) Level of proficiency required for performance of a specific military job, (2) the level of proficiency at which an individual qualifies in that military occupational specialty (AR 351-1).

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Student Pay and Allowance Cost Weekly rate of pay for the model grade of a student based upon the Composite Standard Rates for Existing Military Personnel Services (AR 37-108). This weekly rate multiplied by the course length in weeks is used to compute cost per graduate [ATRM-159 (R1)].

Supervised On-the-Job Training Structured training accomplished while a person is working in a particular skill level and MOS (AR 351-1).

Support Cost That portion of total indirect cost not included in base operations cost per graduate. These are installation costs that include training aids, base communications, medical, and family housing on a pro-rate share of school's military man-years (MMY) supported as a percent of the total benefiting tenant MMY [ATRM-159 (R1)].

System The combination of people, hardware, and information which, when interacting as a whole, is capable of performing a required mission on the battlefield.

System Functional Requirement The attributes or capabilities required to be present in the system elements so that each element and the system as a whole can accomplish assigned actions.

System Scope A precise definition of the range and depth of a weapon system, including (1) number of missions assigned, (2) number of materiel commodities incorporated, and (3) number of distinct platforms and/or components comprising the system.

System Density The quantity of systems requiring maintenance and supply support in a unit, group of units, or at a maintenance level. Stated in terms of the Basis of Issue for units.

System Performance Goals A description of the goals that must be achieved for each system performance measure.

System Performance Measures Measures that describe the performance capabilities that must be achieved for each system function. System performance measures usually consist of speed, rate of fire, etc.

Systems Analysis An orderly approach to helping a decision maker choose a course of action. Its basis is a model or idealized description of the situation under analysis.



## Appendix D

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Table of Organization and Equipment (TOE) A table that prescribes the normal mission, organizational structure, personnel, and equipment requirements for a military unit. It forms the basis for an authorization document (AR 310-25).

Task A unit of work activity that constitutes a logical and necessary step in the performance of a job/duty. It is the smallest unit of behavior in a job that describes the performance of a meaningful function in the job under consideration.

Task Description Concise wording, usually verb-object form, that describes a task.

Task Number A numerical code used to designate a task.

Threat Characteristics The specifics of an enemy threat as determined in a Threat Analysis and stated in a Threat Study (see also Mission Analysis and Mission Characteristics).

Threat Variables The range and complexity an enemy threat can take. Includes the consideration given in a Threat Analysis to the compounding of threat that a new enemy capability can have in concert with other new or existing threats. Also includes consideration of current weakness in countering the new and combined enemy threat.

Training Aids Cost Cost of installation-support training aids adjusted by the total number of training man-weeks.

Training Man-Days The length of class time needed to train an individual student in a course.

Training Resource Requirements Analysis (TRRA) A process used to estimate systematically the training requirements for Army weapon systems during the earliest phases of their development. These requirement estimates include specification of the system's task, course, and resource requirements.

Transients, Trainees, Holders, and Students Rates (TTHS) The percentage of personnel in a paygrade who are unassignable and are therefore unable to contribute to the work associated with the weapon system.

Travel Pay to Course The travel cost per graduate computed on a standard cost per mile. The cost per mile is multiplied by a class average one-way mileage, which is obtained from a sample of student records.

Type of Instruction Type of instruction used for a training course. Typical categories are conference, demonstration, practical exercise, etc. (TRADOC CIR 351-12).

Unscheduled Maintenance, Inherent Those maintenance actions (or events) necessary for restoring an item to a specified condition when the failure has been caused by a condition resulting from an inherent fault in design or strength of material specified.

Unscheduled Maintenance, Induced Those maintenance actions (or events) necessary for restoring an item to a specified condition when the failure has been induced by a condition (including environmental) not resulting from an inherent fault of an item.

Unscheduled Maintenance, Other Those maintenance actions (or events) necessary for restoring an item to a specified condition that was not caused directly by induced or inherent failures. Causes include removal to gain entry, cannot duplicate reported discrepancy, cannibalization, unscheduled inspections, etc.

Workload The amount of work, stated in predetermined work units, that organizations or individuals perform or are responsible for performing (AR 310-25).

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## APPENDIX E    Acronyms and Abbreviations

### A

AETIS	Army Extension Training Information System
AFB	Air Force Base
AFHRL	Air Force Human Resources Laboratory
AFLC	Air Force Logistic Command
AFM	Air Force Manual
AFMPC	Air Force Military Personnel Center
AFR	Air Force Regulation
AFSC	Air Force Specialty Code
AIT	Advanced Individual Training
AMC	Army Materiel Command
ANCOC	Advanced Noncommissioned Officer Course
AOSP	Army Occupational Survey Program
AR	Army Regulation
AR	Availability Ratio
ARI	Army Research Institute
ARTEP	Army Training and Evaluation Program
ASARC	Army System Acquisition Review Council
ASI	Additional Skill Identifier
ASSET	Acquisition of Supportable Systems Evaluation Technology
ASVAB	Armed Services Vocational Aptitude Battery

## Appendix E

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ATRM	Army TRADOC Resource Management
ATRRS	Army Training Requirements and Resources System
ATSC	Army Training Support Center

### B

BCS	Baseline Comparison System
BITE/PITE	Built-In/Plug-In Test Equipment
BNCOC	Basic Noncommissioned Officer Course
BOI	Basis of Issue
BOIP	Basis of Issue Plan
BTC	Basic Technical Course

### C

CANTRAC	Catalog of Navy Training Courses
CD	Combat Developer
CDB	Consolidated Data Base
CDRL	Contract Deliverable Line Item
C-E	Concept Evaluation
CFE	Contractor-Furnished Equipment
CHRT	Coordinated Human Resource Technology
CMF	Career Management Field
CM	Corrective Maintenance
CNET	Chief of Naval Education and Training

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CNATRA	Chief of Naval Air Training
CNM	Chief of Navy Materiel
CNMPC	Chief of Naval Military Personnel Command
CNO	Chief of Naval Operations
CNTECHTRA	Chief of Naval Technical Training
CODAP	Comprehensive Occupational Data Analysis Program
COEA	Cost and Operational Effectiveness Analysis
COI	Course of Instruction
COMTRALANT	Commander, Training Command, Atlantic
COMTRAPAC	Commander, Training Command, Pacific
COPO	Chief of Personnel Operations
COR	Contracting Officer's Representative
COTR	Contracting Officer's Technical Representative
CPU	Central Processing Unit
CSWS	Corps Support Weapon System
CTEA	Cost and Training Effectiveness Analysis

## D

D&V	Demonstration and Validation
DA	Department of the Army
DCD	Directorate of Combat Developments
DCS	Deputy Chief of Staff
DDI	Design Difference Index

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## Appendix E

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DEP	Draft Equipment Publication
DMDC	Defense Manpower Data Center
DoD	Department of Defense
DOTD	Directorate of Training and Doctrine
DPAMMH	Direct Productive Annual Maintenance Man-Hours
DS	Direct Support Maintenance
DSARC	Defense System Acquisition Review Council
DSWS	Division Support Weapon System
DT/OT	Developmental Testing/Operational Testing
DTIC	Defense Technical Information Center

### E

EIC	Equipment Identification Code
E-O	Electro-optical
EPMS	Enlisted Personnel Management System
ETM	Extension Training Materials
EW	Electronic Warfare

### F

FEA	Front-End Analysis
FGC	Functional Group Code
FLIR	Forward-Looking Infrared Radar
FM	Field Manual
FRE	Frequency

---

FSD	Federal Supply Document
FSED	Full-Scale Engineering Development
G	
GFE	Government-Furnished Equipment
GP	Group-Paced
H	
HARDMAN	Hardware vs. Manpower
HCM	HARDMAN Comparability Methodology
HIP	Howitzer Improvement Program
HIPO	Hierarchical and Input/Process/Output Techniques
HMPT	Human Factors, Manpower, Personnel, and Training
I	
I/S	Instructor-to-Student Ratio
ICH	Instructor Contact Hours
ICTP	Individual and Collective Training Plan
IEP	Independent Evaluation Plan
IET	Initial Entry Training
IFF	Identification, Friend or Foe
IKP	Instructor and Key Personnel
ILS	Integrated Logistic Support
IOC	Initial Operational Capability
IPR	In-Progress Review

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## Appendix E

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IPT	Indirect Productive Time
ISD	Instructional Systems Development
J	
JPL	Jet Propulsion Laboratory
JMSNS	Justification for Major System New Start
L	
LCC	Life Cycle Costs
LCN	LSA Control Number
LIN	Line Item Number
LCSMM	Life Cycle System Management Model
LOA	Letter of Agreement
LOGCEN	Logistics Center
LOGSACS	Logistics Structure and Composition System
LRU	Lowest Replaceable Unit
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Record
LSI/VLSI	Large or Very Large Scale Integrated Circuits
M	
MAA	Mission Area Analysis
MAC	Maintenance Action/Allocation Chart
MAP	Materiel Acquisition Process
MARC	Manpower Requirements Criteria

---

MCO	Marine Corps Order
MEEI	Minimum Essential Elements of Information
MFP	Materiel Fielding Plan
MIL-STD	Military Standard
MILPERCEN	Military Personnel Center
MMH	Maintenance Man-hours
MMH/MA	Maintenance Man-hours Per Maintenance Action
MOS	Military Occupational Specialty
MOSB	MOS Training Cost Handbook
MOSC	Military Occupational Specialty Code
MP/OMS	Mission Profile/Operational Mode Summary
MPA	Military Personnel, Army
MPT	Manpower, Personnel, and Training
MR	Maintenance Ratio
MRC	Maintenance Requirement Cards
MRSA	Materiel Readiness Support Activity
MTBF/MTBMA	Mean Time Between Failure/Mean Time Between Maintenance Action
MTTR	Mean Time to Repair
MTTR/MA	Mean Time to Repair Per Maintenance Action

## N

NASA	National Aeronautics and Space Administration
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## Appendix E

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NATO	North Atlantic Treaty Organization
NAVMACLANT	Navy Manpower and Materiel Analysis Center, Atlantic
NAVEDTRA	Naval Education and Training
NAVPERS	Naval Personnel
Navy 3M	Materiel Maintenance Management
NBC	Nuclear, Bacteriological, Chemical
NCOES	Noncommissioned Officer Educational System
NEC	Naval Enlisted Classification
NEPDIS	Navy Enlisted Professional Development Information System
NET	New Equipment Training
NETP	New Equipment Training Plan
NITRAS	Navy Integrated Training Resources and Administration System
NMSO	Navy Maintenance Support Office
NODAC	Navy Occupational Development and Analysis Center
NOTAP	Navy Occupational Task Analysis Program
NTEC	Naval Training Equipment Center
NTP	Navy Training Plans

### O

O&O	Organizational and Operational Plan
OCS	Optimal Class Size
OM	Operational Manning

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OMA	Operations and Maintenance, Army
ORSA	Operations Research/Systems Analyst
OSUT	One Station Unit Training
OT	Operational Test

## P

Pam	Pamphlet
PERT	Program Evaluation Review Technique
PGD	Paygrade
PIB	Program Information Brief
PLDC	Primary Leadership Development Course
POE	Projected Operational Environment
POMCUS	Prepositioned Materiel Configured to Unit Sets
PM	Preventive Maintenance
PM	AMC Program/Project/Product Manager
PM TRADE	Project Manager for Training Devices
PNCOC	Primary Noncommissioned Officer Course
POE	Projected Operational Environment
POI	Program of Instruction
PQS	Position Qualification Standards
PTC	Primary Technical Course
PV	Perturbation Value

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## Appendix E

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### Q

QQPRI	Quantitative and Qualitative Personnel Requirements Information
Quasi-POI	Quasi-Program of Instruction

### R

R&M	Reliability and Maintainability
RAM	Reliability, Availability, and Maintainability
Reg	Regulation
ROC	Required Operational Capability
RPV	Remotely Piloted Vehicle

### S

SAT	Systems Approach to Training
SDC	Sample Data Collection
SEAD	Suppression of Enemy Air Defense
SGMA	Sergeants Major Academy
SINCGARS	Single Channel Ground/Airborne Radio System
SME	Subject-Matter Expert
SOJT	Supervised On-the-Job Training
SP	Self Paced
SPH	Self-Propelled Howitzer
SPT	Support
SQT	Skill Qualification Test
SSC	Soldier Support Center

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SSG	Special Study Group
SSI	Specialty Skill Identifier
SSPO	Strategic Systems Project Office
STP	Soldier Training Publication
SUBLANT	Submarines Atlantic
SUBPAC	Submarines Pacific

## T

TAMMS	The Army Maintenance Management System
TASC	Training and Audiovisual Support Center
TASO	Training Aids Support Office
TB	Technical Bulletin
TCA	Task Comparability Analysis
TD	Training Developer
TDIS	Training Development Information System
TDLR	Training Device Letter Requirement
TDR	Training Device Requirement
TEA	Training Effectiveness Analysis
TFR	Trouble Failure Reports
TLR	Top Level Requirements
TM	Technical Manual
TOE	Table of Organization and Equipment
TQQPRI	Tentative Qualitative and Quantitative Personnel Requirements Information

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## Appendix E

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TRADOC	Training and Doctrine Command
TRAMEA	TRADOC Management Engineering Activity
TRAS	Training Requirements Analysis System
TTHS	Transients, Trainees, Holdees, and Students
TRRA	Training Resource Requirements Analysis
TSM	TRADOC Systems Manager

### U

UHF	Ultra-High Frequency
USAMARDA	US Army Manpower Requirements and Documentation Agency

### V

VHF-FM	Very High Frequency/Frequency Modulated
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### W

WBS	Work Breakdown Structure
WQEC	Weapons Quality Engineering Center
WUC	Work Unit Code
WSAP	Weapons System Acquisition Process

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---



## Appendix F

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---

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---

# APPENDIX G Index

## Volume I

Analysis scope, 3-13  
Annual costs, 2-15  
#Annual man-day requirements, 2-6  
Audit trail, 2-1, 3-43, 3-67  
Availability ratio, 2-21  
  
Baseline Comparison System, 1-6, 1-35  
Bill payer, 2-21, 3-64  
  
Comparability analysis, 1-5, 1-34  
Cost and training effectiveness,  
2-15, 2-33  
Critical resources, 2-24, 3-65  
  
Data management structure, 3-39  
Data source index, 3-37  
Design freedom, 1-18  
  
End-strength, 2-19  
  
Footprint, 3-61  
Functional Group Code, 3-41  
  
High driver, 2-15, 2-19, 3-66  
  
ICTP, 2-28  
Impact analysis, 2-15  
Instructional systems  
development, 1-22  
Intelligence, 1-15  
  
Life Cycle System  
Management Model, 2-33, 3-52  
Level of indenture, 3-13  
Logistic Support Analysis, 2-25  
  
Mission Area Analysis, 1-30  
MOSC, 3-41  
  
Predecessor System, 1-30  
Proposed System, 1-6, 1-34, 1-36

---

## Appendix G

---

QQPRI, 2-29

Quasi-POI, 1-22

Risk, 1-13, 3-52

Scope, 3-1, 3-13

System, 3-5

Systems analysis, 1-12

Time, 1-16

Uncertainty, 1-13, 3-52

## Volume II - IV

Baseline Comparison System 1-1, 1C-2, 1C-25  
Bill payer, 5-10

Comparability Analysis, 1-6  
Corrective maintenance, 1D-9  
Critical resources, 5-17

Design difference index, 1C-53

Equipment comparability analysis, 1C-1  
Equipment identification code, 1C-5

Footprint, 1C-22, 2-2  
Function, 1B-5, 1B-8  
Functional Group Code, 1C-6, 1C-14  
Functional requirement, 1B-4

Generic tasks, 1-5, 1E-1, 1E-5

High driver, 5-1, 5-19

LCSMM, 1A-1, 1C-1  
Level of indenture, 2B-10  
LSAR, 1C-61

Maintainability, 1D-1, 1D-5  
Maintenance, induced, 1D-1, 1D-9  
Maintenance, inherent, 1D-1, 1D-9  
Maintenance, preventive, 1D-9  
Mean time to repair, 1D-7, 1D-8  
Mission, 1A-1  
Mission area, 1A-1, 1A-5  
Mission Area Analysis, 1A-5, 1B-1  
Mission event, 1A-19

## Appendix G

---

Perturbation, 1C-55, 1C-61  
Performance measure, 1B-13, 1B-15  
Performance standard, 1B-13, 1B-15  
Predecessor System, 1-1, 1C-1, 1C-19  
Proponent, 1A-2, 1A-7  
Proposed System, 1-1, 1C-35, 1C-41

Reliability, 1D-1, 1D-5  
Risk, 5-17

Sample Data Collection, 1D-12